These figures emphasise the remarkable accuracy of the method (the largest residual in distance is only four ten-thousandths of a second of arc!). It is stated that with care both angular separation and position-angle can be measured with an accuracy of about 1 per cent. This accuracy is much greater than is possible with a filar micrometer. The method possesses the further advantage that the percentage accuracy in both distance and position-angle does not decrease with decreasing separation; with the filar micrometer, on the other hand, the error of observation increases considerably with decreasing separation. For the successful use of the interference method good "seeing" is not essential, whereas for the observation of close double stars with a filar micrometer very good seeing is necessary. In explanation of this unexpected result it is suggested by Hale that "in bad seeing, when using the whole aperture of the objective, there is an integrated effect of the light-waves meeting in all possible phases, which tends to obliterate the details of the diffraction pattern of the star-image, but that when two light pencils are selected at opposite ends of a diameter the result is not an integration, but a mere displacement of the diffraction-pattern, sufficiently small for the eye to follow."

If the distance between the slits is greater than the value $l = \frac{1}{2}\lambda/\alpha$, which gives a unique position for which the fringes disappear, there will be four position-angles for the slits in which this occurs, these positions being symmetrical with reference to the line joining the two components, viz. $p \pm \theta$ and $p + \pi \pm \theta$, where $p$ is the required position-angle. The most accurate method of observation is to adjust the distance apart of the slits so that $\theta$ is about 30° to 50°, and to measure the four positions in which the fringes vanish, so determining $\theta$ and $p$; if the separation of the slits is $l$, the value to use for the computation of the separation of the components of the binary is $l \cos \theta$, the separation therefore being $\lambda/2l \cos \theta$. If three different values of $l$ are used and the corresponding values of $\theta$ are determined, the accuracy of the observation is increased. We have heretofore supposed that the components are equal in brightness and separated by a distance large compared with their diameters. If they are of unequal brightness the fringes do not completely disappear in any orientation of the slits, but instead the positions of minimum visibility (when the fringes of one star fall between those of the other) are observed. The variation in contrast is greater the more nearly equal the components are in brightness. The method is therefore suitable for the observation of close doubles which do not differ too greatly in brightness and are beyond the limit of resolution of, or observable only with difficulty and under the most favourable conditions with the telescope available, in conjunction with a filar micrometer. The time required for a single observation is longer, but this is more than compensated by the great increase in accuracy of the observation, by the possibility of observing under poor atmospheric conditions, and by the smaller number of observations required for the determination of an orbit. Prof. Hale expresses the hope that through a co-operative plan of observation, in which several observatories will take part, a large number of close binaries may be measured in this way.

An attempt is to be made at Mount Wilson to extend the method to the measurement of stars several minutes of arc apart. Until this is tried it cannot be asserted whether or not the difference of atmospheric disturbances along the optical paths of the two stars would prevent the fringes from being observed. If it proves feasible to observe them in this case it may become possible to measure the displacement of a star by the gravitational field of Jupiter, and thereby provide a further test of Einstein's theory, scarcely possible in any other manner. The method might then also be employed for the determination of stellar parallaxes and proper motions (which depend upon the differential displacements of adjacent stars) with a smaller probable error and in a shorter time than by existing methods. The further investigation of these possibilities of the method will be awaited with great interest.

## The Paris Conference of the Museums Association.

FOR an association which, during the first thirty years of its existence, has confined its meetings to cities in the British Isles, the proposal to hold this year's conference in Paris seemed somewhat hazardous. Whatever objections may have presented themselves to some members, there can be no doubt that the experiment proved a greater success than any anticipated. During the week July 11–17 the seventy delegates from national, municipal, and semi-private museums, with their president, who, by good fortune, happened to be a man of such distinction as Sir Frederic Kenyon, were received in the most cordial manner by the heads of the State Museums of Art and of Science, by the Conseil Municipal and by the directors of its museums, and by the authorities of Les Invalides, the Bibliothèque Nationale, and similar institutions. Receptions at the Louvre, the Musée d'Histoire Naturelle, the Hôtel de Ville, and the club "Autour du Monde" enabled members to become personally acquainted with many French colleagues; and visits to the numerous and rich collections of Paris, Versailles, St. Germain, and Malmaison, under the guidance of distinguished authorities, with privileges accorded only to heads

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of State among the lay public, enlarged the ideas of the British visitors almost beyond the limits of receptivity.

The inspiration and the actual knowledge of material and methods thus acquired cannot fail to benefit the museums and the municipalities which were wise enough to send their representatives across the Channel. On the other side of the account our French friends were good enough to admit some profit to themselves. The conservators of provincial museums in the recently formed French association were particularly pleased to see so many councillors of important cities, like Glasgow, Manchester, Hull, Carlisle, and Exeter, taking a keen interest in the proceedings and setting an example to their French brethren. Not only did the French museum officials observe with a pleased surprise that men of science and of art could co-operate to their mutual advantage, but the two camps in Paris were also (for the first time, one gathered) brought into friendly personal communication, so that the association may have begun the building of a new bridge across the Seine, from the Jardin des Plantes to the Louvre.

Among museums of interest to readers of NATURE, special mention should be made of the Musée National d'Histoire Naturelle, round the various departments of which the visitors were guided by Dr. Louis Mangin and members of his staff. It was pleasing to see how large had been the exchange of casts between this museum and our own Natural History Museum, and to recognise excellent specimens of British provenance. At the Musée Cluny Mr. De Montrémy explained the difficulties of arranging collections in a medieval mansion, and the curators noted how successfully he had overcome them. At the Louvre the recently introduced system of guide-lecturers attracted the attention of museum administrators. Demonstrations are given in French, English, Italian, and Spanish; there are from twelve to fourteen a week at the Louvre, and a few in the other art museums of the State. To restrict numbers and defray expenses, admission is by ticket, costing 3 francs each lecture. Some of the members listened to an admirable exposition of the work of David by Mr. Rey, who is the organiser of the lectures. The wonderful collections of prehistoric archæology at St. Germain, excellently displayed, and most kindly demonstrated to the party by Dr. Salomon Reinach, were among the greatest scientific treasures, and professional curators also appreciated the visit to the workshops.

To allow for the numerous outside attractions, the proceedings in the conference room were wisely limited. Dr. Hoyle's account of the system of registration employed at the National Museum of Wales provoked a lively discussion on the contrasted merits of books, loose-leaf ledgers, and card indexes. But here the chief feature was undoubtedly Sir Frederic Kenyon's presidential address, which, while dealing with the arrangement of museums of art and archæology from a general point of view, in reference to space and design, sketched out the lines on which, in the opinion of its director, the British Museum might most advantageously be modified. The congestion to which Sir Hercules Read has of late directed public attention has to be met. Experience shows that the growth of the collections cannot be overtaken by the mere addition of buildings. Recourse must be had to the storage in accessible cases of a large part of the collections, after the example set by the departments of natural history, of prints and drawings, of printed books, of manuscripts, and of coins. For the collection of Greek vases a division into three parts will be adopted, after the plan suggested by a former president of the association eighteen years ago—namely, a public gallery instructively and beautifully arranged; a series for study by amateurs; and a stored collection accessible to specialists. This method will save much room in many departments. More room, however, must be given to ethnography, since each distinct civilisation in time or space needs a distinct room for its display. A lecture room is required; the plans are prepared, and only await the funds to carry them out. A gallery should also be devoted to temporary exhibitions. The library ought to remain as the centre, with a ring of exhibition galleries round it, and an outer rectangle of storage and working rooms. Sir Frederic Kenyon concluded by enumerating some ways in which the British Museum could help local museums, and intimated that other ways would gladly be entered on if the curators of the local museums would make their needs known.

At the receptions in the Louvre and the Hôtel de Ville, as also at the association dinner, to which many of the French hosts were invited, Sir Frederic Kenyon emphasised the international importance of the gathering. The delegates from the national and municipal museums of Great Britain might, he said, be regarded as ambassadors preaching the gospel of peaceful civilisation and cementing the ties contracted by the two allied nations in war. This meeting might prove the first step towards an international association of museums, such as had long been in the minds of some members, and was again set up as an ideal by Dr. Loir, secretary of the Association of French Museums.

It was the enthusiasm with which Dr. Loir welcomed the suggestion of a Paris meeting, first publicly made at the Havre congress of the Association Française pour l'Avancement des Sciences (1914), that enabled the idea to be realised at last. It was the work of Prof. Roule and Drs. Bruyère and Lemoine, of the Musée d'Histoire Naturelle, that facilitated the execution of the plan. But the especial thanks of the association were accorded to its secretary, Dr. Tattersall, and to Mrs. Tattersall for their strenuous labours in seeing that the most audacious and the most far-reaching enterprise of the Museums Association was carried through most happily to a successful end.

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